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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/526,513	03/04/2005	Torsten Solf	PHDE020203US	8935

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EXAMINER	
BITAR, NANCY	

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
05/15/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/526,513	SOLF ET AL.	
	Examiner	Art Unit	
	NANCY BITAR	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 February 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12 and 14* is/are rejected.

7)☒ Claim(s) *11 and 13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's response to the last Office Action, filed 02/08/2007, has been entered and made of record.

2. Applicant has amended claims 1-4.6-7, and 9 . Claims 11-14 have been added. Claims 1-14 are currently pending.

3. Applicant's arguments, in the amendment filed 02/08/2008 with respect to the rejections of claims 1-10 have been fully considered but are moot in view of the new ground(s) of rejection necessitated by the amendments. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Strommer et al (US 2002/0049375) and Guerziec et al (US 5,951,475).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action**:**

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 1-10, 12, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Strommer et al (US 2002/0049375) and Guerziec et al (US 5,951,475)**.

As to claim 1, Strommer et al teaches a method of optimizing a two-dimensional image of a body volume which contains an object, in which the method comprising:
acquiring a first two-dimensional image of the body volume with the object in the body volume (note that two dimensional image acquisition device 104 detects a plurality of two dimensional images of the inspected organ through image transducer 118, paragraph [0150]);
acquiring a three-dimensional representation of feasible locations of the object within the body volume(in processor 234 , the three dimensional location and orientation of the image is detected where MPS system, figure 1, detects the three dimensional location and orinetation of the image detector using MPS sensor 162, paragraph [0151]), determining a current position of the object in the body volume based on the first two dimensional image (note that in processor 236, each detected two-dimensional image is associated with the location and orientation information thereof and the organ timing signal at the time the two dimensional image was taken, paragraph [0152], detecting real time image, 836, figure 22) ; associating the current position of the object with the three-dimensional representation (main computer 102 associates each detected image with the location and orientation information thereof and the organ timing signal, paragraph [0152]); determining imaging parameters which are optimum in respect of the position of the object based on the three-dimensional representation (see paragraph 0153-154], note that figure 3 is the visualization of the orientation and location of the 2D image); and controlling movement of an imaging system based on the imaging parameters (note that the physician controls the movement of the surgical tool , paragraph [0154]); and generating a second two-dimensional image of the body volume based on the optimum imaging parameters (838,840,

figure 22).While Strommer meets a number of the limitations of the claimed invention, as pointed out more fully above, Strommer fails to teach the image as being a two dimensional image he generates more a three dimensional representation with respect to the location and orientation. Specifically, Gueziec et al. teaches registering two dimensional fluoroscopic images with a three dimensional model of a surgical tissue of interest. The method includes steps of: (a) generating, from CT or MRI data, a three dimensional model of a surgical tissue of interest; (b) obtaining at least two, two dimensional, preferably fluoroscopic, x-ray images representing at least two views of the surgical tissue of interest, the images containing radio-opaque markers for associating an image coordinate system with a surgical (robot) coordinate system; (c) detecting the presence of contours of the surgical tissue of interest in each of the at least two views; (d) deriving bundles of three dimensional lines that pass through the detected contours; and (e) interactively matching three dimensional points on three dimensional silhouette curves obtained from the three dimensional model with the bundles of three dimensional lines until the three dimensional model is registered within the surgical coordinate system to a predetermined level of accuracy. The step of iteratively matching includes steps of: defining a distance between surfaces of the model and a beam of three dimensional lines that approach the surfaces; and finding a pose of the surfaces that minimizes a distance to the lines using, preferably, a statistically robust method, thereby providing a desired registration between a surgical robot and a preoperative treatment plan. .it would have been obvious to one of ordinary skill in the art to generate a 2 D image of the body volume in Strommer et al.step 246 in order to readily visually determine on the 2-D projection whether the registration is accurate, whereas a 3-D view can be useful for

providing three dimensional spatial relationships. Therefore, the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention by applicant.

Strommer et al teaches a method as claimed in claim 1, wherein the two-dimensional image is a projection of the body volume which has been generated by means of X-rays (Two-dimensional image acquisition device 104 can be of any type known in the art, such as ultra-sound, inner-vascular ultra-sound, X-ray, see paragraph [0101]) and wherein the second two-dimensional image is generated without using external markers for comparing images (The pair of closely spaced transducers define a line which calculates the tangent to the curve defined by the catheter imaging tip at that point. The tangent is calculated by the line defined by the two or more points determined by the location of the tracking transducers [paragraph [0022])

The limitation of claim 3 has been addressed above (refer to Strommer et al, figure 1 and 2).

Strommer et al teaches an imaging system as claimed in claim 3, wherein it includes further comprising an X-ray apparatus with an X-ray source and a detector which are attached to a movable C-arm, wherein the second two-dimensional image is generated without using external markers for comparing images (see figures 1, and paragraph [0093], note that the the detection id performed by a medical monitoring device which is selected according to the inspected organ, note that the surgical tool moves paragraph [0124])).

As to claim 5, Strommer teaches an imaging system as claimed in claim 4, wherein the X-ray apparatus includes adjustable diaphragms whose adjustment forms part of the imaging

parameters optimized by the data processing unit (modifying at least one of the two dimensional images by discarding a portion thereof which represents the surgical tool, 240, figure 6).

As to claims 6 and 7, Gueziec teaches an imaging system as claimed in claim 3, wherein the imaging parameters comprises at least one of a sectional plane of an image and a projection direction (see figures 3 and 4).

As to claims 8 and 9, Gueziec teaches an imaging system as claimed in claim 3, wherein the feasible locations of the object are vessels within a biological body volume, and that the data processing unit is arranged to define the optimum imaging parameters causing the segment of the vascular tree in which the object to be projected essentially in a planar fashion in the two-dimensional image (FIG. 1A, the calibration rod 12 is positioned along two ruled surfaces that are referred to as the "near plane" and the "far plane". In this description it is assumed that such surfaces are planar, but the method is not restricted to planes. The "near plane" is the plane closer to the x-ray source 14A and further away from the x-ray detector (image intensifier 14B) than the far plane)

As to claim 10, Gueziec teaches an imaging system as claimed in claim 3, wherein it includes a device for the formation of images and is arranged to display the two-dimensional image in superposed form together with an image formed from the three-dimensional representation with completely the same or partly the same imaging parameters (The effect is that the image of the beads forms a calibration grid that is superimposed on the x-ray image data that is output from the image intensifier 14B to the data processor 16, figure 1B,1C), the image formed from the three-dimensional representation preferably reproducing an area which is larger

than that reproduced by the two-dimensional image (The area is then determined by computing first the areas of the triangles formed with the origin and a polygon segment and by summing such areas. Once the polygonal curves defining the markers have been extracted the method retains the (x,y) coordinate on the marker in the image. These coordinates are measured in the image coordinate system with respect to an image origin, note that the three-dimensional coordinate is greater than the two dimensional image, note that the superimposition of 3-D models on 2-D images helps in achieving realistic texture mapping to the models, see also Strommer et al figure 22).

As to claims 12 and 14 , Strommer teaches the method of claim 1, further comprising generating the second two- dimensional image without using back projection of the first two-dimensional image (super imposing a representation of the surgical tool onto the selected three dimensional image, figure 6, 246)

Allowable Subject Matter

6. Claims 11 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to NANCY BITAR whose telephone number is (571)270-1041. The examiner can normally be reached on Mon-Fri (7:30a.m. to 5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 571-272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Andrew W. Johns/
Primary Examiner, Art Unit 2624

Nancy Bitar 04/01/2008